

**STATE OF TENNESSEE
DEPARTMENT OF ENVIRONMENT AND CONSERVATION
DIVISION OF UNDERGROUND STORAGE TANKS
TECHNICAL GUIDANCE DOCUMENT - 006**

Effective Date: January 1, 1994

RE: Standard Drilling Log

The purpose of this Technical Guidance Document (TGD) is to provide a standard drilling log which shall be completed for all borings and monitoring wells installed during site investigations. The drilling log has been developed to ensure that appropriate observations are made during boring and/or monitoring well installation activities and to provide consistency for facilitating a more timely review. Legible hand drafting is acceptable.

The attached drilling log shall be used. The drilling log may be copied or is available from the Division on a diskette. The sections shall be completed as follows:

<u>Facility Name:</u>	Facility name where the tank(s) are/were located
<u>TN Fac. ID #:</u>	Seven digit number assigned to the facility by the Division
<u>Well # &/or Boring #:</u>	Well and/or boring number consistently referenced throughout all reports and plans
<u>Location Map:</u>	Site sketch locating the well or boring in relation to buildings, tank pit(s), and other important features
<u>Start Date & Time:</u>	Date and time that drilling began
<u>Comp. Date & Time:</u>	Date and time of boring or monitoring well completion
<u>Logged By and Lic. #:</u>	Name and license number of the individual logging the well and/or boring
<u>Driller:</u>	Driller's name and name of drilling company
<u>Drilling Method:</u>	Drilling method(s) used to complete the boring or monitoring well
<u>Project #:</u>	Section provided for the convenience of the company or professional completing the log
<u>Elev (MSL):</u>	Elevation of the top of the boring or monitoring well referenced to MSL

<u>T.D. (MSL):</u>	Elevation of the bottom of the boring or monitoring well referenced to MSL
<u>Comments:</u>	Any pertinent information not included in the columns provided on the log
<u>MSL:</u>	Mean sea level elevation in feet for ground level, top of well casing, top of screen, bottom of screen, and bottom of well
<u>Completion Diagram:</u>	Detailed monitoring well schematic which shall indicate but not be limited to the type and diameter of the well, borehole diameter, depth of borehole, depth of well, type of casing and screen, slotted screen size, grain size of sand pack, depth to top of screen, depth to top of sand pack, and depth to top of bentonite seal (Symbols in Table 1)
<u>Water Level:</u>	Water level first encountered and at completion of the well (Symbols in Table 1)
<u>Penetration Rate:</u>	Blow count, min./ft., etc.
<u>Depth:</u>	Depth in feet below ground level (the log shall be scaled 4ft./in.)
<u>Graphic Lithology:</u>	Soil and/or rock lithology including secondary porosity, fossils, intrusions, and structural defects (Symbols in Table 2)
<u>OVD:</u>	Organic Vapor Detector reading from headspace analysis
<u>Samples & Cores:</u>	
<u>Type</u>	Type of sample or core indicated as: SS - Split spoon ST - Shelby Tube CS - Continuous sample RC - Rock core
<u>Int/Rec</u>	Sample location and/or interval for analytical or physical testing or description and recovery. Symbols are shown in Table 1.
<u>Anal.</u>	Sample taken for analysis and indicated as shown in Table 1

Description: Description of the soil and/or rock including but not limited to:

- a. Rock Type/Soil Type Primary and secondary lithologies
- b. Composition/Texture Size and shape of the particles; cement and matrix; fossiliferous (Abbreviations in Table 3)
- c. Strength/Consistency The following modifiers may be used to enhance the soil strength description:

brittle	fails suddenly with little strain;
elastic	rubbery;
friable	crumbles easily; and
sensitive	loses strength on remolding.

Table 3 lists abbreviations for strength and modifiers. The terms for consistency are presented in Table 4.
- d. Color Table 3 lists abbreviations (It is not necessary to use the Munsell Color Chart Notation)
- e. Moisture Table 3 lists abbreviations
- f. Origin Determine if the soil is residual (weathered in place from parent material) or has been transported and deposited. Transported and deposited soils include alluvium, colluvium, loess, glacial till or drift, and man-made fill. (Abbreviations in Table 3)
- g. Structure Type of bedding, weathering, voids, and secondary porosity (Abbreviations in Table 3)

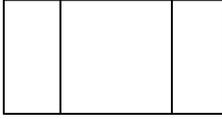
FACILITY NAME:		TN FAC. ID#:	WELL#: &/or BORING#:	pg 1 of ___
LOCATION MAP:		START DATE & TIME:		PROJECT #: Standard Boring Log State of Tennessee Underground Storage Tank Division Department of Environment and Conservation
		COMP. DATE & TIME:		
		LOGGED BY:	TN LIC#:	
		DRILLER:		
		DRILLING METHOD:		
		ELEV (MSL):	T.D. (MSL):	
COMMENTS:				



MSL	COMPLETION DIAGRAM BOREHOLE DIAMETER:	WATER LEVEL	PENETRATION RATE	DEPTH	GRAPHIC LITHOLOGY	OVD	SAMPLES & CORES			DESCRIPTION (Color, Texture, Structure, etc...)
							TYPE	INT./REC	ANAL	
				0						
				5						
				10						
				15						
				20						
				25						
				30						

Table 1

Completion Diagram Symbols:



SOLID PIPE WITH NO PACKING



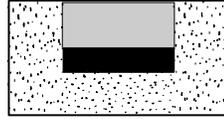
SLOTTED PIPE PACKED IN SAND

DOTS (5.X) / DASH (.5X)



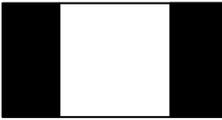
GROUT SEAL AROUND SOLID PIPE

ANS131 (1.X)



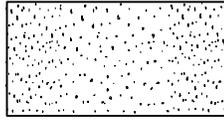
END PIPE ON SLOTTED PIPE PACKED IN SAND

DOTS (5.X) / ANS137 (.2X)



BENTONITE SEAL AROUND SOLID PIPE

ANS137 (.2X)



SAND PACK

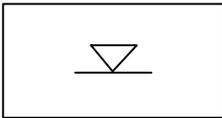
DOTS (5.X)



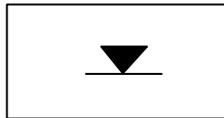
SOLID PIPE PACKED IN SAND

DOTS (.5X)

Water Level Symbols:



WATER LEVEL FIRST ENCOUNTERED



WATER LEVEL ON COMPLETION

Sample Symbols:

SS- SPLIT SPOON

ST - SHELBY TUBE

CS - CONTINUOUS SAMPLE

RC - ROCK CORE

X - 75-100% RECOVERY

> - 50-75% RECOVERY

< - 25-50% RECOVERY

I - 0-25% RECOVERY

BTX - BENZENE, TOLUENE, & XYLENES

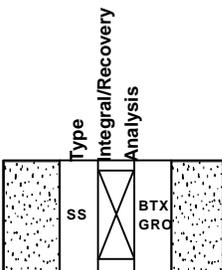
GRO - GASOLINE RANGE ORGANICS

DRO - DIESEL RANGE ORGANICS

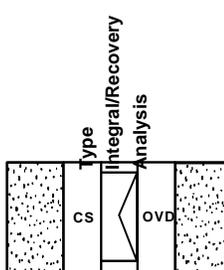
HB+ - METHOD 418.1 OR 503 E

OVD - ORGANIC VAPOR DETECTOR

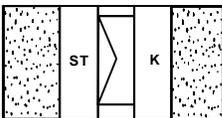
k - PERMEABILITY



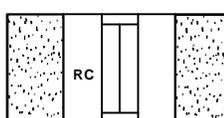
**SPLIT SPOON SAMPLE
75-100% RECOVERY
ANALYZED FOR btx & GRO**



**CONTINUOUS SAMPLE
25-50% RECOVERY
ANALYZED WITH OVD**

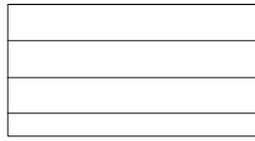


**SHELBY TUBE SAMPLE
50-75% RECOVERY
ANALYZED FOR PERM.**



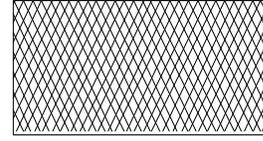
**CORE
0-25% RECOVERY**

Table 2
Soil & Rock Lithology Symbols:



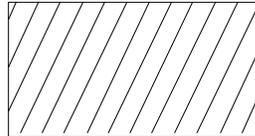
CLAY

LINE (.5X)



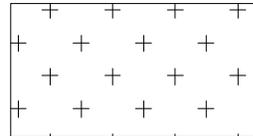
COAL/LIGNITE

ANS137 (.2X)



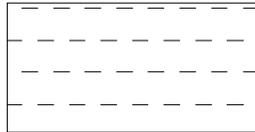
SILT

ANS131 (.5X)



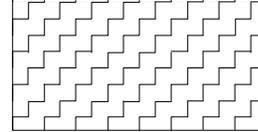
IGNEOUS

CROSS (.5X)



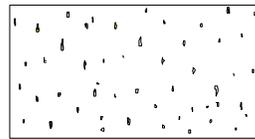
SHALE

DASH (.5X)



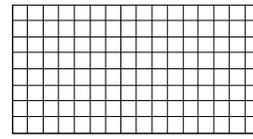
METAMORPHIC

ZIGZAG (.5X)



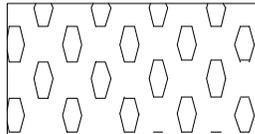
SAND

DOT (.5X)



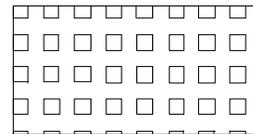
CONCRETE

NET (.5X)



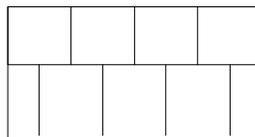
GRAVEL

HEX (.3X)



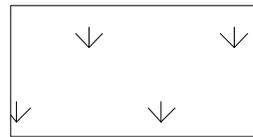
ASPHALT

SQUARE (.5X)



LIMESTONE

BRICK (.5X)



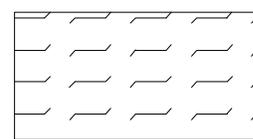
ORGANIC SOIL

GRASS (.4X)



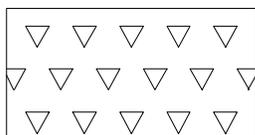
DOLOMITE

DOLMIT (.4X)



FILL

FLEX (.5X)



CHERT

TRIANG (.5X)

Table 2 (continued)
Modifying Components, Cement,
Etc.:

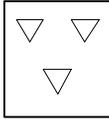
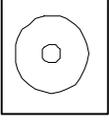
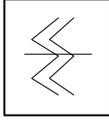
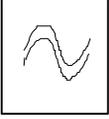
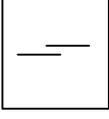
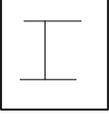
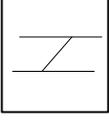
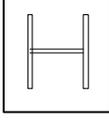
	FOSSILS		CHERT		SILT
	OOLITES, PISOLITES, CONCRETIONS, ETC.		SAND		FRACTURES
	BEDDING PLANES		CLAY, SHALE		VISIBLE POROSITY (DESCRIBE IN COMMENTS)
	CALCITE, LIMESTONE		DOLOMITE		HYDROCARBON ODOR OR STAINING, FREE PRODUCT, ETC. (DESCRIBE IN COMMENTS)

Table 3
Abbreviations

COMPOSITION

Bo.= Boulder
 Gv.=Grave(ly)
 Sa.=Sand(y)
 Si.=Silt(y)
 Cl.=Clay(ey)
 Pt.=Peat(y)
 Sh.=Shells
 Rk.=Rock
 Wd.=Wood
 Qz.=Quartz
 Mi.=Mica(eous)
 Ca.=Calcareous
 Og.=Organic(s)
 Co.=Coarse
 Md.=Medium
 Fn.=Fine
 An.=Angular
 Ro.=Rounded
 Gd.=Graded
 Un.=Uniform
 Ls.=Loess

Moisture

Dy.=Dry
 Ms.=moist
 We.=Wet
 Sat.=Saturated

Strength

Ls.=Loose
 Fm.=Firm
 Dn.=Dense
 So.=Soft
 St.=Stiff
 Hd.=hard
 Cp.=Compressible
 Pl.=Plastic
 F.=Friable

Modifiers

D.=Dark
 L.=Light
 H.=High(ly)
 M.=Moderate(ly)
 S.=Slight(ly)
 P.=Partial(ly)
 V.=Very
 W.=Well
 E.=Elastic
 Sb.=Sub

Origin

Al.=Alluvium(al)
 Rs.=Residium(al)
 Fl.=Fill
 Ru.=Rubble
 Ts.=Topsoil

Color

Bl.=Blue
 Bk.=Black
 Bn.=Brown
 Gn.=Green
 Gy.=Gray
 Or.=Orange
 Rd.=Red
 Tn.=Tan
 Wh.=White
 Mt.=Mottled
 Mu.=Multicolored
 Str.=Streaked
 Yl.=Yellow

Structure

Bd.=Banded
 Cv.=Cavity
 De.=Decomposed
 Fg.=Fragment(s)
 Ho.=Homogeneous
 Jt.=Joint(ed)
 La.=Laminated
 Ln.=Lens(es)
 Sk.=Slickenside
 Sm.=Seam
 Sr.=Stratified
 Vv.=Varved
 Wt.=Weathered
 Vd.=Void(s)
 Fr.=Fracture(d)
 Fa.=Fault

Table 4 Terms For Consistency

Consistency of Predominately Fine - grained Soils (Silts and Clays)

<u>Term</u>	<u>Field Test on Soil</u>
Very Soft	Easily squeezed between fingers
Soft	Molded by light finger pressure
Firm	Molded by strong finger pressure
Stiff	Dented by strong finger pressure
Very Stiff	Dented only slightly by strong finger pressure
Hard	Dented only slightly by thumbnail finger pressure
Very Hard	Difficult to excavate by pick

Consistency of Predominately Coarse - Grained Soils (Fine Gravels and Sands)

<u>Term</u>	<u>Field Test on Soil</u>
Very Loose	Easily penetrated by 1/2" rebar pushed by hand
Loose	Easy effort to excavate by handshovel
Firm	Easily penetrated by 1/2" rebar driven with 5 lb. hammer
Very Firm	Moderate effort to excavate by handshovel
Dense	Penetrated a foot by 1/2" rebar driven with 5 lb. hammer / Difficult to excavate by handshovel
Very Dense	Penetrated only a few inches by a 1/2" rebar driven with 5 lb hammer / Difficult to excavate by pick